ALASKA LEGISLATURE COMMITTEE FILES 1987-1988 8672
5448 SRES YUKON FISHERY HEARING / NENANA

Catch Reporting: Table 2 compares the catch "quotas" with in-season estimates from roe sales and catches from end of the season surveys. Differences between these data point out the difficulty associated with determining the magnitude of subsistence catches by any method. Large differences between catches derived from these two methods are generally the result of the following: 1) continued legal fishing after roe sales are prohibited; 2) incomplete catch documentation during end of season surveys; 3) intentional and unintentional reporting errors by fishermen and 4) all roe from subsistence caught salmon is not sold.

Kuskokwim and Yukon River king salmon catches obtained from fishermen interviews have always been larger than catches derived from roe poundages. The major reason for this is that legal subsistence fishing normally continues after roe sales for this species have been prohibited.

The average chum salmon catch obtained from Kuskokwim River fishermen interviews during 1974-77 has been approximately 25 percent smaller than the average catch estimated from roe poundages. Fishermen from four villages (Napaskiak, Kwethluk, Bethel and Tuluksak) in 1977 reported catches that were 40 percent less than those estimated from roe sales. It is believed that this is a result of the incompleteness of Department surveys and reporting errors by fishermen. From close inspection of individual records, there is little doubt that some fishermen are intentionally underreporting their catches. The reasons for this are not clear, but may involve a sense of guilt for harvesting more salmon than required.

Due to difficulties involved with obtaining timely and accurate in-season estimates, annual king and chum catch "quotas" for the Kuskokwim River were substantially exceeded before roe sales for these species

Table 2. Comparison between "quotas" and actual catches obtained from roe sales and from fishermen interviews, AYK Region, 1974-77. (1977 actual catches are preliminary).

	Kuskokwim River (subdistricts 1 & 2)			
King Salmon	1974	1975	1976	1977
"Quota" 1/	None	27,600	27,600	27,600
Catch 2/	20,300	32,000	43,000	36,300
Catch 3/	25,100	45,400	59,600	53,700
Chum Salmon				
"Quota" 1/	None	169,800	169,800	169,800
Catch 2/	313,000	185,100	246,100	222,900
Catch 3/	260,900	158,250	202,800	176,350
	Yukon River (excluding Yukon Territory)			
King Salmon	1974	1975	1976	1977
"Quota" 1/	None	17,050	17,050	17,050
Catch 2/	637	2,363	3,533	10,378
Catch 3/	14,237	12,806	10,371	10,417
Chum Salmon				
"Quota" 1/	None	207,491	207,491	207,491
Catch 2/	131,567	142,656	171,567	114,451
Catch 3/	222,798	199,794	162,217	153,802

1/ "Quotas" established by Department in 1975 and adopted as Board regulations in 1976: subsistence roe sales prohibited when king salmon catches exceed 1974 recorded catches by 10% and when chum salmon catches exceed 1970-74 average annual recorded catches.

2/ Catches estimated in-season from lbs. of subsistence roe sold using sex ratio and average roe weight per fish information.

3/ Catches from systematic personal interview and survey of subsistence fishermen conducted at end of fishing season, 1977 catch data preliminary.

were prohibited by emergency order. During the 1977 season, buyers were required to submit written reports twice a week, but this was largely ineffective in monitoring production due to reporting errors and the large amounts of roe often sold during a single day.

Wastage: Department of Fish and Game and Public Safety personnel documented only five or six instances of intentional fish wastage during the past four years involving carcasses left to rot in garbage dumps or along the shore. Violation citations were not issued due to lack of evidence regarding names of persons involved. Fish wastage during the fishing season is difficult to detect and prosecute since the disposal of carcasses must be witnessed and is relatively easy to conceal (by throwing fish into the river or into bank vegetation).

However, many reports or complaints have been received from local residents involving the intentional wastage of salmon carcasses. A total of nine reports involving wastage were received in 1977, more than in any other year. Most of these alleged violations were reported for the middle Yukon and Tanana River areas ranging from a few fish to over 1000 fish. Although many of these alleged violations were personally witnessed, informants would not indicate the names of persons involved. In nearly all the aforementioned instances of documented and alleged carcass disposals, the roe had been removed from the female salmon.

Another difficult to detect, but potentially greater form of wastage exists. Large quantities of dried salmon captured the previous summer have been observed by Department personnel in caches and smokehouses of several Kuskokwim villages during the spring. If properly cared for, dried salmon can be kept overwinter to be utilized as dog food the following summer. Due to the poorer condition of these fish, many probably have been discarded when fishing during the current year's run

begins. Often the portion of the catch in excess of real need is stored in the open and is very susceptible to spoilage. Again, local residents have reported that this form of wastage does occur in some Yukon and Kuskokwim River communities.

At the beginning of the 1977 season, Department personnel examined 34 caches (storehouses) in several lower Kuskokwim River villages and fish camps. A total of 2210 dried salmon harvested during the 1976 season were observed in 23 of these caches. Eleven caches did not contain any salmon from the previous year. Most cache owners were fishing and beginning to dry salmon (1977).

While visiting one of the villages located downstream of Bethel in mid-June of 1977, a Department employee learned that one or more local residents were broadcasting over citizens band radio that last year's dried fish should be discarded. The reason that prompted this action is not clear, but may include an attempt to "hide" fish taken in excess of need.

Violation Citations: Protection officers working out of the Bethel office during the summer of 1977 issued seven citations involving violations of regulations pertaining to the sale of subsistence salmon roe. Six of these were issued for the Kuskokwim River with one issued for the Yukon River. The majority of these violations involved illegal purchases or sales of subsistence roe during closed periods. Three violations were successfully prosecuted, two were closed with no leads, one was closed as no violation and one is still pending adjudication. Few violation citations involving subsistence roe sales were issued prior to the 1977 season.

Exceptionally Large Individual Catches and Sales: Individual records were examined to pinpoint extremely large subsistence catches and earnings from roe sales which were made by a small minority of the fishermen. Records were examined during all years for Yukon fishermen and during only 1977 for Kuskokwim fishermen. The largest Yukon individual catches, composed of a majority of chum salmon, occurred in the middle Yukon and Tanana River. Villages in these areas generally have a large number of sled dogs that are used for competitive racing. Several fishermen captured in excess of 5,000 chum salmon each season with a high individual catch of 15,000 reported. Four or five fishermen each year made unusually large chum salmon catches but owned relatively few dogs. These fishermen captured a total of 84,317 chums during the four year period which averaged 900 fish per dog each year. One fisherman with three persons in the family and owning only three dogs took 8,000 chum salmon in a single season. Highest individual earnings from subsistence roe sales of $9,200 was made by a Tanana fisherman in 1977. Another Tanana River fisherman made $9,000 in 1974 when roe prices were approximately one-third of current prices.

Individual catches for the Kuskokwim River during 1977 in excess of 300 kings and 1200 chums were considered substantially above average. Most of the large individual catches were made in the middle Kuskokwim area and in one or two lower river villages. The largest catch of 400 kings and 2900 chums was made by a fisherman with four persons in the family owning only two dogs. An individual high of $8,300 in roe sales was made from this catch. The next greatest individual earnings from roe sales was $6,800.

Circumvention of Regulatory and Statutory Intent: Other incidences that

were documented by Department personnel were not violations, but involved attempts to circumvent the intent of existing regulations and statutes. Fishermen who hold entry permits can fish for commercial and subsistence purposes. Many Yukon fishermen sell only male salmon in the round to commercial fish buyers and retain females for subsistence selling the roe. At least two Yukon buyers, specializing in subsistence roe production, continued to purchase only females ($2.00 ea.) after the close of the subsistence roe "season". Also several commercial salmon buyers complained that many deliveries made to their plants consisted of nearly all males which was not in their best economic interests.

Changes in Subsistence Catches and Fishing Effort: Prices increased substantially in all areas during the 1977 season and there was intense competition between buyers for subsistence roe. A carnival like atmosphere developed near the end of the roe "seasons" in the Kuskokwim River when buyers began bidding against one another. Some buyers offered fishermen price increases of up to $1.00 a pound during the last day or two of the "season". In the Kuskokwim River the largest amounts of king salmon roe (approx. 22%) were sold on the last day of the season. In the middle river (subdistrict 2) the pounds of king salmon roe sold on the last day of the season was twice that for any other day. Similarly the pounds of chum salmon roe sold during the last day of the season in this same area was three times that for any other day. Chum roe sales in the lower river (subdistrict 1) did not demonstrate this trend and were spread more evenly throughout the "season". This information along with observations made during 1977 aerial and boat surveys indicated that fishing effort, except during the subdistrict 1 chum salmon run, increased after the announced roe "season" closures and declined sharply after the roe "seasons" were closed. These conditions are symptomatic of a fishery exhibiting profit motivation.

Subsistence catches of chum salmon, the most abundant species, declined throughout a majority of the A-Y-K region during 1966-73 due to decreased effort resulting from fewer sled dogs being kept and more employment opportunities. Kuskokwim River catches did not exhibit a similar decline during this period. Yukon and Kuskokwim River chum salmon catches in areas open to subsistence roe sales increased substantially during 1974-77 compared to previous recent years. This increase was probably due to a combination of factors that included above average run magnitudes and increased fishing effort due to the ability to sell subsistence roe.

Table 3 compares subsistence catch trends for selected Kuskokwim River villages during the four year period prior to and after the legalization of subsistence roe sales. The average 1970-74 catch for villages representative of the area of legal roe sales increased 35 percent compared to the 1970-73 period. The average 1970-74 catch for villages representative of the closed area decreased 4 percent compared to the 1970-73 period. The average 1970-74 catch for Upper Kalskag and Lower Kalskag, in the area open to roe sales, increased 111 percent compared to the previous four years. Other villages in the area of legal roe sales with substantially increased catches during the 1970-74 period included Napaskiak, Akiak, Tuluksak and Aniak.

Table 4 compares subsistence catch trends for selected Yukon River villages. The average 1974-77 catch for villages representative of areas where a majority of the roe sales occurred increased 69 percent compared to the previous four years. Increased catches were the greatest for Anvik, Grayling and Manley Hot Springs. All villages exhibited increased harvests during 1974-77 with Tanana having the smallest increase. The average 1974-77 catch for villages representative of areas either closed to roe sales or where sales did not occur increased 22 percent

Table 4 . Comparison of subsistence salmon catch trends for selected Yukon River villages for periods 1970-73 and 1974-77[1/]

Village Roe Sales Permitted (1974-77)

Village	Roe Sales Prohibited					Roe Sales Permitted					
	1970	1971	1972	1973	Average	1974	1975	1976	1977	Average	(% change)
Anvik	9,991	8,273	3,761	20,923	10,737	29,372	31,007	26,744	23,914	27,759	(+159%)
Grayling	12,703	7,316	6,613	13,294	9,982	27,968	24,576	27,617	15,751	23,978	(+140%)
Nulato	27,190	18,839	8,012	13,875	16,979	38,473	23,671	14,221	13,596	22,490	(+ 32%)
Tanana	23,378	25,701	14,569	11,760	18,852	13,236	26,422	22,930	19,648	20,559	(+ 9%)
Manley	170	-0-	105	62	84	196	6,213	9,726	16,944	8,270	(+9745%)
Nenana	11,755	21,364	21,755	14,837	17,428	20,828	27,167	15,209	24,909	22,028	(+ 26%)
Totals	85,187	81,493	54,815	74,751	74,062	130,073	139,056	116,447	114,762	125,034	(+ 69%)

Village Roe Sales Prohibited (or did not occur)

	1970	1971	1972	1973	Average	1974	1975	1976	1977	Average	(% change)
Alakanuk	11,583	9,011	6,243	7,012	8,462	13,312	3,786	11,229	6,804	8,783	(+ 4%)
Emmonak	7,446	5,714	5,128	11,206	7,374	7,596	5,391	8,795	7,563	7,336	(0%)
Hughes	6,483	17,280	2,804	2,573	7,285	8,796	5,454	4,435	4,929	5,903	(- 19%)
Huslia	4,030	1,473	535	4,517	2,639	6,670	5,048	8,812	3,603	6,033	(+129%)
Allakaket	7,887	9,041	892	2,538	5,090	7,172	5,760	4,446	3,808	5,296	(+ 4%)
Ft. Yukon	7,367	4,204	2,117	3,610	4,325	1,172	19,673	2,281	14,691	9,454	(+119%)
Totals	44,796	46,723	17,719	31,456	35,174	44,718	45,112	39,998	41,397	42,806	(+ 22%)

1/ king and chum catches combined

compared to the previous four years. Four of these villages exhibited no appreciable change in catch trends over the eight year period, but two villages, Huslia and Ft. Yukon, exhibited substantial increases although the total numbers of fish were small.

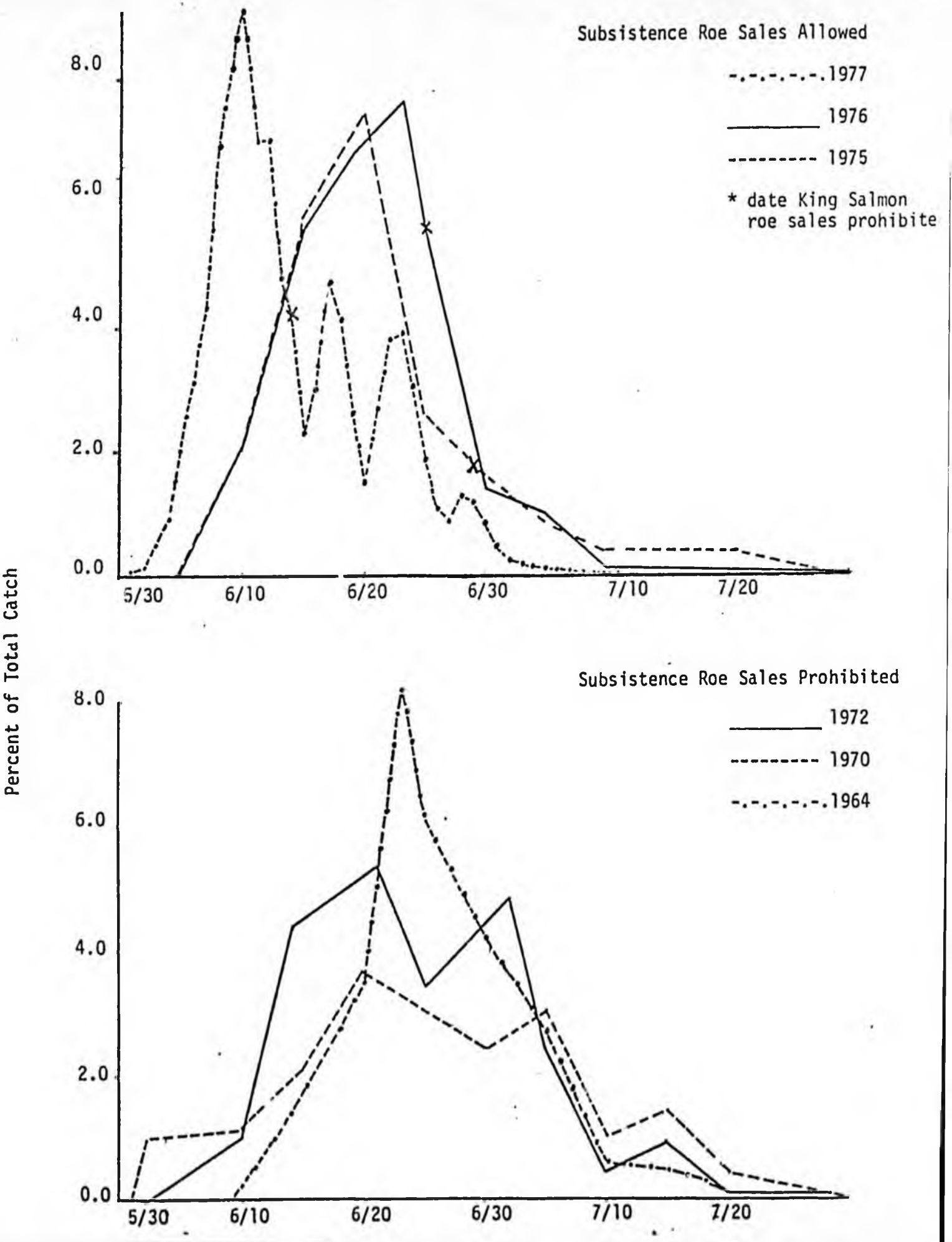
There are some indications that subsistence fishermen are exerting more effort during the early portion of the season (and runs) which may be in response to competing with other fishermen for an increased share of the subsistence roe sales. Figure 3 shows seasonal catch patterns for the Kuskokwim River during and prior to the legalization of subsistence roe sales. Generally these graphs show catches were made during a longer time span during years when roe sales were not allowed. The 1964 season was an exception, but the run that year was exceptionally late and of short duration. If this trend of greater fishing effort early in the season continues, then measures will have to be taken to spread subsistence harvests throughout the run to prevent overharvesting of specific stocks. This will require additional weekly closures.

Due to increasing subsistence effort, mainly in the middle Yukon and Tanana River, increased subsistence fishing weekly closures for all major fisheries were promulgated by the Board of Fisheries beginning with the 1977 season. Also the large subsistence king salmon catches made in the Kuskokwim River during the last two years has resulted in shorter commercial fishing seasons for that species.

Conclusions and Recommendations

The issues associated with subsistence roe sales are complex and require careful examination of economic and social as well as biological factors. The Legislature has requested that the Department make a recommendation on the fate of future subsistence roe sales. The Board of Fisheries, which is ultimately responsible for the promulgation of all fisheries regulations and the Legislature itself, must make the

Figure 3. Kuskokwim River (subdistrict 1) daily subsistence king salmon catches.



final decision.

The opposition to continued subsistence roe sales being expressed by local residents must be given strong consideration. The first hand knowledge of persons residing year round in rural communities cannot be duplicated by occasional surveys and visits to these same communities by State employees. As previously indicated, abuses associated with the subsistence roe fishery are difficult to detect by conventional fishery surveillance methods.

Five separate proposals have been submitted for consideration at the December 1977 meeting of the Board of Fisheries recommending complete prohibition of continued subsistence roe sales. All of these were submitted by local residents or organizations representing local residents including the Lower Kuskokwim and Lower Yukon Fish and Game Advisory Committees. Two other proposals were also submitted by local residents that involve greater restrictions upon subsistence roe sales. For the first time in four years, fishermen have openly discussed problems associated with roe sales not only among themselves, but with Department biologists and Fish and Wildlife Protection officers indicating a growing unrest over this issue.

It is the Department's recommendation to the Board of Fisheries and the Legislature that the sale of subsistence salmon roe be prohibited statewide beginning with the 1978 fishing season. This recommendation is based on several factors which include:

1) Continuation of the sale of subsistence salmon roe will require further fishing restrictions and re-examination of the Department's policy of affording subsistence fishing the highest priority among beneficial fishery uses. A relatively few persons fishing primarily for the purpose of selling roe will adversely

affect others who are much more dependant on a subsistence livelihood.

2) The growing opposition by local fishermen who are the direct beneficiaries of continued roe sales, indicate that abuses associated with subsistence roe sales are more widespread and serious than indicated.

3) The trends of increasing subsistence catches and effort, apparently in response to profit motivation, could jeopardize future maintenance of salmon stocks especially during years of small runs.

The loss of revenues to both fishermen and processors resulting from the prohibition of subsistence roe sales can be expected to be controversial. Individual fishermen and processors will be affected differently depending on the availability of alternate resources and incomes. Although a comprehensive analysis of the economic impact of roe sales prohibition was beyond the purview of this report, preliminary analysis indicate that relatively few individuals are making substantial incomes from subsistence roe sales.

If subsistence roe sales are prohibited attention must be focused on methods of preparation and storage of roe for local use. Salmon roe was apparently used as a foodstuff for both humans and dogs to a greater extent many years ago. Fuller use locally could result in a decrease in subsistence demands and other expenses. Sled dogs are on the increase in some villages and use of salmon roe as a dogfood supplement will reduce the need for subsistence salmon and commercial dogfood.

The popularity of subsistence roe sales in upriver areas was due partly to the limited commercial fishing opportunities existing in these areas that included small commercial catch quotas, lack of markets, and persons ineligibile for entry permits. Restrictions have since been

relaxed in some of the upstream fisheries. For example, average earnings by commercial fishermen in the Anvik - Ruby area now rival those in the lower Yukon.

Prohibition of roe sales is expected to result in the stabilization or reduction of subsistence salmon catches in the near future, especially for chum salmon. If substantial catch declines occur and the biological status of the runs are unchanged, a surplus would be available for commercial harvesting. The Board of Fisheries could exercise the option of allowing the surplus to be harvested in the local commercial fishery.

Prohibition of subsistence roe sales can be expected to result in attempts at blackmarketing. Due to the small department staff, remoteness and vast size of the fisheries and the existence of subsistence fisheries within major commercial fishing areas, special steps will have to be taken to minimize blackmarketing of subsistence roe to include:

1) Require buyers of commercial salmon to submit weekly reports detailing production of both fish and commercial roe. The Department will continue to sample catches each week for average roe weight and sex ratio information to determine amounts of roe contained in the commercial catch. "Overages" will indicate possible illegal purchases of subsistence roe which will not be allowed to exceed established limits.
2) Units of processed (boxes) or unprocessed (buckets) of roe will be assigned consecutive numbers by each buyer and these units must be examined by a department representative prior to being shipped to another location.
3) Commercial buyers will be required to purchase both male and female salmon in the same ratio obtained from the fishing gear; fishermen will be required to follow the same conditions.

4) Temporary fishery technicians will continue to be used to monitor subsistence catches in selected communities. A coordinated surveillance program targeting commercial buyers must be worked out in advance with the Division of Fish and Wildlife Protection.

APPENDICES

Appendix I

LAWS OF ALASKA

1975

Source: SB 451 am

Chapter No.: 99

AN ACT

Relating to the sale of subsistence caught salmon eggs; and providing for an effective date.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* Section 1. INTENT. (a) It is the intent of sec. 2 of this Act to permit the sale or trade of salmon roe in the Arctic-Yukon-Kuskokwim District under strict permit and regulatory provisions to assure the health of subsistence economies in areas where such use will not jeopardize or interfere with the maintenance of existing salmon stocks.

(b) It is the intent of sec. 3 of this Act to control the waste of salmon resources.

* Sec. 2. AS 16.05 is amended by adding a new section to read:

Sec. 16.05.827. SALE OF SUBSISTENCE SALMON ROE. (a) Notwithstanding sec. 940(17) of this chapter, the board may adopt regulations permitting the sale of subsistence salmon roe under conditions the board considers advisable.

(b) The board may permit subsistence salmon roe sales under (a) of this section if

(1) the accustomed contribution of salmon to particular subsistence economies will be maintained, as modified by current needs; and

(2) subsistence salmon roe sales will not jeopardize or interfere with the maintenance of salmon stocks on a sustained yield basis.

(c) No person may purchase or trade for or attempt to purchase or trade for subsistence salmon roe unless he

possesses an annual permit issued by the commissioner. The commissioner may specify terms and conditions of a permit required under this section. No license, entry permit or interim permit is required for the specific act of selling subsistence salmon roe. No person may purchase or transport or attempt to purchase or transport salmon roe which he knows or has reason to know was taken in violation of this section or regulations adopted under it.

(d) If the commissioner finds that sale of subsistence salmon roe is resulting in waste of salmon carcasses, damage to salmon stocks, or circumvention of salmon management programs, he may close any or all areas to subsistence salmon roe sale by emergency order. If the commissioner finds that the subsistence catch in an area exceeds or is likely to exceed, by 10 per cent, the 1978 subsistence catch for that area, he shall close that area to subsistence salmon roe sale by emergency order.

(e) Original purchasers of subsistence salmon roe shall record information required by the department on fish tickets supplied by the department.

(f) The board may adopt regulations it considers necessary for the administration of this section. The board may delegate its authority under this section to the commissioner.

(g) A person who violates this section or a regulation adopted under it is punishable by a fine of not more than $10,000, or by imprisonment for not more than six months, or by both.

(h) In this section, "subsistence salmon roe" means salmon roe incidentally obtained as an unavoidable by-product of lawful subsistence fishing.

* Sec. 3. AS 16.05 is amended by adding a new section to read:

Sec. 16.05.331. WASTE OF SALMON. (a) It is unlawful for a person to waste salmon intentionally, knowingly, or with reckless disregard for the consequences. In this section, "waste" means the failure to utilize the majority of the carcass, excluding viscera and sex parts, of salmon which are to be

(1) sold to a commercial buyer or processor;

(2) utilized for consumption by humans or domesticated animals; or

(3) utilized for scientific, educational, or display purposes.

(b) The commissioner may authorize other uses of salmon upon request if he finds that to do so would be consistent with maximum and wise use of the resource.

(c) A person who violates this section or a regulation adopted under it is punishable by a fine of not more than $10,000, or by imprisonment for not more than six months, or

by both. In addition, a person who violates this section is subject to a civil action by the state for the cost of replacing the salmon wasted.

* Sec. 4. Sections 1(a) and (2) of this Act expire January 1, 1977.

* Sec. 5. This Act takes effect immediately in accordance with AS 01.10.070(c).

Approved by governor: May 29, 1975
Actual effective date: May 30, 1975

ARTICLE 8.
PURCHASE AND SALE OF SALMON ROE

Section
805. Sale of salmon roe
810. Salmon roe sales prohibited

5 AAC 03.805. SALE OF SALMON ROE. (a) Salmon roe incidentally obtained as an unavoidable by-product of lawful subsistence fishing may be purchased or sold only in accordance with the provisions of AS 16.05.827 and the provisions of this section and sec. 810 of this chapter.

(b) Each person who purchases or processes subsistence-caught salmon roe shall obtain an annual permit issued by the commissioner or his authorized representative. Permits must be retained in the possession of the permittee and readily accessible for inspection at all times. Permits shall be obtained by the permittee in person from a representative of the department at least 48 hours prior to purchasing or processing any subsistence-caught salmon roe. A separate permit must be obtained for each district, as described in sec. 200 of this chapter, in which purchases are made. No person may initiate any purchase of or accept any subsistence-caught salmon roe, unless that person has a valid permit for the district. Permits may designate requirements for weekly reports, roe ticket reporting, times and areas open to sale or processing and plant inspection.

(c) Purchasers of subsistence-caught salmon roe shall complete all purchases on the basis of the price per pound of unprocessed roe.

(d) Any permittee who violates the terms of his permit or any other regulation or provision of law may have his permit revoked immediately by the commissioner.

(e) Each person who purchases or processes salmon roe shall submit weekly reports to a local representative of the department containing the following information:

(1) weight in pounds by species of unprocessed subsistence-caught salmon roe purchased;

(2) weight in pounds by species of unprocessed commercially caught salmon roe purchased; and

(3) number of whole salmon by species purchased from commercial fishermen.

(f) Information required by (e) of this section must be in the form of totals for the previous week and for the entire season to date.

(g) Permittees shall record information for each purchase of subsistence-caught salmon roe on roe tickets provided by the department. All entries on the roe ticket shall be completed by the permittee. Roe tickets required by this section may not be used to record information pertaining to purchases of commercially caught salmon or salmon roe. Roe tickets required by this section shall be completed at the time the transfer of roe to the permittee is made. A copy of each roe ticket shall be given to the fisherman selling the roe and to the local representative of the department.

(h) Unless waived by stipulations contained in the permit required by this section, permittees shall comply with provisions of 5 AAC 39.130(a) and (b). Fish ticket requirements in 5 AAC 39.130(b) apply to roe tickets.

(i) All purchases of subsistence-caught salmon roe may be made only from the fisherman who took the salmon or a member of his immediate household. No person may act as a sales agent or in a similar capacity for purposes of vending subsistence-caught salmon roe to any permittee or other person.

(j) The sale of subsistence-caught salmon roe will be prohibited by emergency order in any district or subdistrict when the subsistence salmon catch exceeds or is likely to exceed the 1970-74 average annual harvest. In no instance will the sale of subsistence-caught roe be allowed to continue in any district or subdistrict if the subsistence salmon harvest exceeds or is likely to exceed the 1974 subsistence harvest by 10 percent.

(k) If the commissioner closes any district, subdistrict, or other area to subsistence-caught roe sales, no person may initiate, enter into or consummate any purchase agreement within the closed area for subsistence-caught roe after the closure becomes effective.

(l) No person may enter into, initiate, or consummate any purchase agreement for roe of subsistence-caught salmon roe in any district or subdistrict which is closed to the sale of subsistence-caught salmon roe. No permittee may purchase or process roe from any subsistence-caught salmon which he knows or has reason to know were taken from waters described in sec. 810 of this chapter.

(m) As used in this section, "purchase" means to buy, trade for, or otherwise receive subsistence-caught salmon roe for valuable consideration. No person may give or receive without valuable consideration subsistence-caught salmon roe.

(n) In areas open to the sale of subsistence-caught salmon roe, salmon taken for subsistence purposes must be consumed by the fisherman taking the fish or by a member of his immediate household.

Authority: AS 16.05.827

5 AAC 03.810. SALMON ROE SALES PROHIBITED. No person may sell, trade, purchase, transport, or attempt to do any of these acts with roe from subsistence-caught salmon taken from any of the following waters:

(1) all waters in the Northern, Kotzebue, Port Clarence and Norton Sound districts;

(2) in the Yukon district, all waters listed under sec. 350 of this chapter;

(3) in the Kuskokwim district, all waters listed under sec. 350 of this chapter except in the lower portions of the Eek and Kwethluk Rivers as indicated by stream markers placed by the department;

(4) in any waters closed to subsistence salmon fishing.

Authority: AS 16.05.827

Appendix III. Subsistence salmon roe sale information by sub-area and year, Kuskokwim area, 1974-77.

		Pounds of unprocessed roe		Value	No. persons	Av. value
		King salmon	Chum Salmon	of sales	reporting	per person 1/
Lower Kuskokwim River Mouth to Akiak	1974	28,350	93,643	$ 164,934	1187	$ 139
	1975	19,811	40,839	$ 91,358	977	$ 94
	1976	53,678	65,448	$ 256,848	987	$ 260
	1977	29,930	80,657	$ 407,827	929	$ 439
	(Average)	(32,987)	(70,147)	($ 230,242)	(1020)	($ 226) 1/
Mid-Kuskokwim River, Akiak - Chauthbalok	1974	3,932	4,861	$ 11,871	160	$ 131
	1975	2,304	16,534	$ 28,257	128	$ 108
	1976	6,300	27,134	$ 69,239	227	$ 269
	1977	17,994	31,376	$ 203,211	290	$ 701
	(Average)	(7,633)	(19,976)	($ 78,145)	(201)	($ 389) 1/
Totals - Kuskokwim River	1974	32,462	98,504	$ 176,805	1347	$ 131
	1975	22,115	57,373	$ 119,615	1105	$ 108
	1976	59,978	92,582	$ 326,087	1214	$ 269
	1977	47,924	112,033	$ 611,038	1219	$ 501
	(Average	(40,620)	(90,123)	($ 308,386)	(1221)	($ 253) 1/
Quinhagak	1974	1,631	93	$ 2,327	91	$ 26
	1975	2,284	236	$ 3,780	92	$ 41
	1976	2,232	2,959	$ 10,066	107	$ 94
	1977	3,250	,967	$ 24,838	85	$ 292
	(Average)	(2,349)	(,814)	($ 10,252)	(94)	$ 109) 1/
Goodnews Bay	1974	488	5	$ 666	2/	2/
Hooper Bay	1975	0	102	$ 153	3	$ 51
Area Totals	1974	34,581	98,602	$ 179,798	1433	$ 125
	1975	24,399	57,711	$ 123,548	1200	$ 103
	1976	62,210	95,541	$ 336,153	1321	$ 254
	1977	51,174	116,000	$ 635,876	1304	$ 488
	(Average)	(43,091)	(91,964)	($ 318,844)	(1316)	($ 242) 1/

1/ Average sales value ÷ average number of persons for sub-area
2/ Information not available

Appendix IV. Subsistence salmon roe sale information by sub-area and year, Yukon area, 1974-1977

		Pounds of unprocessed roe		Value of Sales	Number of Persons Reporting	Value of Sales Per Person
		King Salmon	Chum Salmon			
Lower Yukon (Mouth to Holy Cross	1974	0	4,342	$ 3,256	35	$ 93
	1975	612	4,908	7,296	44	165
	1976	2,253	1,830	6,286	50	125
	1977	7,143	4,585	41,766	194	218
	(Averages)	(2,502)	(3,916)	($14,651)	(81)	($181) 1/
Mid Yukon (Anvik-Ruby)	1974	51	26,670	20,041	91	220
	1975	45	32,478	37,401	108	346
	1976	494	38,532	48,783	126	387
	1977	2,872	29,640	[illegible],280	222	366
	(Averages)	(866)	(31,830)	($46,876)	(137)	($343) 1/
Upper Yukon Tanana - Upstream	1974	1,701	14,613	12,236	69	177
	1975	1,300	14,787	18,500	75	246
	1976	1,377	11,303	15,850	83	191
	1977	2,582	10,497	32,698	126	259
	(Averages)	(1,740)	(12,800)	($19,821)	(88)	($225) 1/
Tanana River	1974	700	33,940	25,980	42	619
	1975	510	18,367	21,711	36	603
	1976	1,706	16,992	28,511	72	396
	1977	2,810	18,708	53,795	90	598
	(Averages)	(1,432)	(22,002)	($32,499)	(60)	($542) 1/
Area Totals	1974	2,452	79,565	$61,513	237	$260
	1975	2,467	70,540	84,908	263	323
	1976	5,830	68,657	99,430	331	300
	1977	15,407	63,430	209,539	632	332
	(Averages)	(6,539)	(70,548)	($113,847)	(366)	($311) 1/

1/ Average sales value divided by average number of persons for sub-area.

Appendix V. Commercial salmon catches and fishermen values for the Kuskokwim and Yukon Rivers, 1974-1977.

Kuskokwim 1/	Numbers of Fish				$ Value to Fishermen
	King	Chum	Red, Coho, Pink	Totals	
1974	31,000	196,000	269,000	496,000	$1,056,000
1975	28,000	224,000	128,000	380,000	899,000
1976	49,000	232,000	167,000	448,000	1,380,000
1977	58,000	299,000	282,000	639,000	3,675,000
Totals	166,000	951,000	846,000	1,963,000	$7,010,000
[Averages]	[42,000]	[238,000]	[212,000]	[491,000]	[$1,753,000]
Yukon					
1974	98,000	879,000	16,000	993,000	$1,921,000
1975	64,000	985,000	2,000	1,051,000	1,793,000
1976	89,000	762,000	5,000	856,000	2,151,000
1977	96,000	795,000	36,000	927,000	4,300,000
Totals	347,000	3,421,000	59,000	3,827,000	$10,165,000
[Averages]	[87,000]	[855,000]	[15,000]	[957,000]	[$2,541,000]
Totals					
1974	129,000	1,075,000	285,000	1,489,000	$2,977,000
1975	92,000	1,209,000	130,000	1,431,000	2,692,000
1976	138,000	994,000	172,000	1,304,000	3,531,000
1977	154,000	1,094,000	318,000	1,566,000	7,975,000
Total	513,000	4,372,000	905,000	5,790,000	$17,175,000
[Average]	[128,000]	[1,093,000]	[226,000]	[1,448,000]	[$4,294,000]

1/ Also includes catches from Quinhagak and Goodnews Bay.

Appendix VI. Subsistence salmon catches made in the Kuskokwim and Yukon Rivers 1964-77 (catches rounded to nearest 1000 fish).

Year	Kuskokwim River			Yukon River		
	King	Chum 1/	Total	King	Chum 1/	Total
1964	29,000	190,000	219,000	16,000	481,000	497,000
1965	27,000	283,000	310,000	17,000	449,000	466,000
1966	50,000	175,000	225,000	12,000	206,000	218,000
1967	58,000	205,000	263,000	16,000	275,000	291,000
1968	30,000	260,000	290,000	12,000	179,000	191,000
1969	40,000	199,000	239,000	14,000	208,000	222,000
1970	69,000	246,000	315,000	14,000	222,000	236,000
1971	43,000	116,000	159,000	25,000	221,000	246,000
1972	40,000	120,000	160,000	20,000	135,000	155,000
1973	39,000	179,000	218,000	24,000	207,000	231,000
1974	27,000	277,000	304,000	20,000	302,000	322,000
1975	48,000	176,000	224,000	12,000	282,000	294,000
1976	58,000	224,000	282,000	18,000	254,000	272,000
1977 2/	53,000	190,000	243,000	17,000	251,000	268,000
Totals	611,000	2,840,000	3,451,000	237,000	3,672,000	3,909,000
[Averages]	44,000	203,000	247,000	17,000	262,000	279,000

1/ Includes small numbers of other salmon species.
2/ Preliminary catches.

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES

1987
YUKON AREA
SALMON REPORT

to the
Board of Fisheries
November 1987

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BACKGROUND

Area Boundaries and Legal Gear

The Yukon area includes all waters of the Yukon River drainage in Alaska and coastal waters from Canal Point light near Cape Stephens to the Naskonat Peninsula. For management purposes, the area is divided into six districts and 10 subdistricts (Figure 1). Commercial and subsistence fishing occurs along the 1,200 mile length of the Yukon River (in Alaska) and in the lower 220 miles of the Tanana River. The Lower Yukon area (Districts 1, 2, and 3) includes the coastal waters of the area and that portion of the drainage from the mouth to Old Paradise Village (river mile 301). The Upper Yukon area (Districts 4, 5 and 6) is that portion of the drainage upstream of Old Paradise Village to the US/Canada border, including the Tanana River drainage. Commercial and subsistence fishing additionally occurs in Canada, with fishery management activities conducted by Canadian Department of Fisheries and Oceans (DFO). Annual Yukon River drainage salmon harvests have exceeded 1.1 million fish since 1974 (Tables 1-5).

Legal commercial fishing gear consists of set and drift gill nets in the lower Yukon area and fishwheels and set gill nets in the upper Yukon area. Open skiffs powered by outboard motors are used to operate the fishing gear and to deliver fish to tenders or shore based buying stations. Subsistence gear commonly used to capture salmon include gill nets and fishwheels.

Management Considerations

The overall objective of the Department's research and management program is to manage the various salmon runs for optimum sustained yield.

Subsistence has been designated by the legislature (State Law 151) as the highest priority among beneficial uses of fish and game resources. Except in areas where intensive commercial fisheries occur, the subsistence fishery is subject to few restrictions in order to give preference to subsistence users. The majority of Yukon River fishermen usually take salmon for both commercial and subsistence purposes in major commercial fishing areas. Therefore, in order to enforce commercial fishing regulations, it is necessary to place some restrictions on the subsistence fishery. For example, during the commercial salmon fishing season in most areas, subsistence fishing is allowed only during the open commercial fishing periods. During the course of the year, however, substantially more subsistence fishing time is allowed than commercial fishing time.

Management is made difficult by the character of salmon runs, the nature of the various fisheries (for example, the rapid evolution of the lower Yukon set net fishery into a drift net fishery), and the river itself. Since most of the commercial fisheries have only developed or expanded in recent years, there is a lack of adequate escapement and return data on which to fully evaluate the effects of increased commercial harvests. The various Alaska fisheries, which are scattered over 1,400 river miles, harvest mixed stocks usually several weeks and hundreds of miles from their spawning grounds. Because the Yukon River commercial fisheries harvest mixed stocks, some tributary populations may be under- or overharvested in relation to their actual abundance. For example, in a mixed-stock fishery, where it is impossible to manage each stock separately, some small spawning populations may be reduced to very low levels or even eliminated.

Research projects are underway and additional studies are planned, once additional funding becomes available, to obtain the biological information necessary for better management of the

salmon runs. The current projects include: (1) chinook and fall chum salmon stock separation studies using scale pattern analysis and electrophoretic techniques, (2) side-scanning sonar and tower counting to obtain accurate daily and seasonal escapement estimates in important tributaries (Anvik, Andreafsky, and Sheenjek Rivers), and (3) main river sonar study (near Pilot Station) to obtain estimates of total Yukon River salmon abundance.

Management of the Yukon River commercial salmon fishery must be conservative because of the difficulty in determining run size, harvesting of mixed stocks, increased effort and efficiency of the commercial fleet, allocation problems, and the need to provide for upriver escapements and subsistence requirements. Important management techniques in addition to utilizing guideline harvest ranges include establishing gill net mesh-size restrictions, weekly fishing periods, and season closures. If it becomes apparent during the fishing season (based on analysis of commercial and test fish catch data and hydroacoustic abundance estimates) that the run is substantially smaller or larger than needed for escapement and subsistence requirements, commercial fishing time is adjusted through the use of emergency order or, less frequently, emergency regulation authority.

Status of Fishery, Stocks, and Management Strategies

All five species of Pacific salmon occur in the Yukon River, with chum salmon being the most abundant, followed by chinook, coho, pink, and sockeye salmon. Commercial salmon fishing (for chinook salmon) of the Yukon River dates back to 1918, but the multi-species salmon fishery did not become fully developed until the mid-1970's. In the Alaskan portion of the Yukon River for the period 1982-1986, the average commercial salmon harvest was 1.0 million fish and 200,000 lbs roe (Table 2). The harvest of male summer chum salmon taken incidental to the roe directed fishery

is not included in this total. The average subsistence harvest 1982-1986 was 508,000 fish (Table 3).

Approximately 800 commercial fishermen (665 in the 3 lower districts) and 20 processors participate in the fishery. The ex-vessel value of the commercial salmon catch has averaged $6.6 million for the period 1982-1986. Approximately 1,000 fishing families from 37 communities with a total population of nearly 9,000 (not including the greater Fairbanks area) harvest salmon for subsistence utilization within the Yukon River drainage in Alaska.

Salmon run timing into the Yukon River is quite variable. Chinook salmon generally begin entering the river during late May or early June in response to spring weather conditions. By early to mid-June the summer chum salmon migration is in progress. The chinook salmon migration has usually passed through the lower river by the first week of July, being of short duration, while summer chum salmon are usually present in the lower river in significant numbers through the middle of July. Fall chum salmon generally begin entry into the river by the middle of July and are present into September. Coho salmon generally begin entry into the river by the end of the first week of August and entry continues well into September.

Initiation of the commercial salmon fishery in the lower Yukon area occurs by emergency order in response to run timing, generally 5-15 June. A guideline harvest range of 60,000-120,000 chinook salmon has been established for Districts 1 and 2 and 1,800-2,200 for District 3. Harvests toward the mid-point of the guideline harvest ranges should be expected if the run is of average magnitude. No summer chum salmon guideline harvest range has been established. The commercial fishery is only opened after it has been determined (by monitoring test fishing and subsistence catches) that a sustained migration of chinook salmon

is occurring and that the early portion of the run has passed through the lower river. Generally, initial fishing periods have occurred on a twice weekly, 24-hour period schedule utilizing unrestricted mesh size gill nets directed toward the harvest of chinook salmon. During the 1986 season the first commercial period was directed toward the harvest of summer chum salmon due to an early and strong return. Prior to the 1985 season it was only on achievement of the chinook salmon harvest goal that mesh size restrictions were implemented to direct the harvest toward summer chum salmon. Since 1985, during years of high summer chum salmon abundance and early run timing, restricted mesh size periods have been implemented to harvest available summer chum salmon prior to the end of the chinook salmon directed fishery. Management of the summer chum salmon fishery is greatly dependent on action taken toward chinook salmon since both species exhibit similar run timing.

In the upper Yukon area (istricts 4-6) commercial salmon fishing begins 15 June by regulation. Individual chinook salmon guideline harvest ranges are in effect for each district with a combined harvest range of 5,550-6,950 fish. Fishing generally occurs twice weekly during 48-hour fishing periods.

The fall chum and coho salmon fishing season is established by emergency order. Fall chum salmon harvest levels are governed by guideline harvest ranges in the lower Yukon area (0-110,000 fish) and by combined fall chum and coho salmon guideline harvest levels in the upper Yukon area (0-50,250 fish). No coho salmon guideline harvest level is in effect in the lower Yukon area. Harvest levels are dependent on management action taken toward fall chum salmon. In each district, fishing frequency and duration is dependent on the Department's perception of the strength of the fall chum salmon return.

Chinook Salmon

Chinook salmon spawning populations are widely distributed throughout the Alaskan and Canadian portions of the Yukon River drainage. Major spawning streams include the Andreafsky, Anvik, Nulato, Salcha and Chena Rivers; in the Canadian portion of the drainage (Yukon Territory), important chinook salmon systems include the Big Salmon and Nisutlin Rivers.

Total utilization (subsistence and commercial catch combined) of chinook salmon in the Yukon River has increased during the recent 5-year period as compared to prior years. In Alaska for the period 1982-1986 total harvest (commercial and subsistence combined) averaged 169,000 fish, an increase of 7% compared to the previous 5-year average (1977-1981) of 157,000 fish (Tables 2 and 3). This increase was due to a 36% increase in subsistence catches from the 1977-1981 average as compared to the 1982-1986 average, while the average commercial catch during the same time periods were similar. In addition, during these same periods Canadian total utilization of chinook salmon has increased 72% (Table 4).

Information obtained from scale pattern analysis and tagging studies indicates that some chinook salmon stocks have undergone increased exploitation in recent years resulting in escapements which will not maintain sustained yield. These high exploitation rates are the result of excessive chinook salmon harvests during recent years on runs of average magnitude. Unusually large returns during 1979-1981 set a trend for high harvest levels. Beginning in 1982 run strength dropped but harvests remained high.

In general, chinook salmon escapement trends, (index stream escapements) from 1976 through 1981 were consistently above other

years (Table 6). Total utilization of the returns from these parent years have been in excess of that which can be sustained.

The Alaska Board of Fisheries has not addressed chinook salmon regulation proposals since November 1984. In response to increased commercial fishing fleet efficiency and increased utilization by subsistence fishermen, it has become increasingly necessary for the department to utilize emergency order authority to implement changes from traditional fishing schedules to allow for adequate spawning area escapements. It may become necessary to reduce commercial chinook salmon fishing time below that of recent years, or further increase the delay in opening the season to provide for adequate spawning area escapement and to allow for the subsistence use priority.

Summer Chum Salmon

Summer chum salmon are the more abundant of the two chum salmon runs that occur in the Yukon River. Summer chum salmon can be distinguished from fall chum salmon by the following characteristics: (1) earlier run timing (early June to mid-July in the lower river); (2) rapid maturation in fresh water, (3) smaller body size (6-7 lb), (4) greater population size, and (5) spawning occurs primarily in lower 600 miles of the drainage.

The Anvik River supports the largest spawning population; other important spawning areas include the Andreafsky, Nulato, Rodo, Salcha, and Hogatza River drainages. Although runs fluctuate greatly in abundance from year to year, Yukon River summer chum salmon stocks, with possible exceptions, have not experienced declining escapements (Table 7). Documented harvests and escapements during recent years show minimum run sizes ranging from 1.2 to 5.6 million fish.

Total utilization of summer chum salmon has averaged over a million fish annually (1977-1986). Average commercial related catches, including males taken during roe directed fisheries, decreased 4% during 1982-1986 as compared to those of 1977-1981, while subsistence catches increased 24% during the same time periods (Tables 2 and 3). Since 1978, due to relatively poor flesh quality of upriver summer chum salmon, a roe directed fishery has occurred primarily in sub-district 4A. The average roe harvest taken during 1982-1986 was 198,000 lbs, double the average harvest taken from 1978-1981.

The Alaska Board of Fisheries has not addressed summer chum salmon regulation proposals since November of 1984. At that time the Board endorsed a regulation to implement summer chum salmon directed fishing periods in the lower Yukon area by emergency order. This allows for harvest of summer chum salmon prior to termination of the directed chinook salmon season. This management strategy will be implemented during years summer chum salmon run strength is average or better in magnitude.

Fall Chum Salmon

Fall chum salmon have the following differentiating characteristics from summer chum salmon: (1) later run timing (mid-July to early September in the lower river), (2) larger size (7-9 lbs), robust body shape, and bright silvery appearance in the lower river, (3) smaller population size, and (4) spawning that occurs in the upper portions of the drainage in spring fed streams.

Major spawning areas are located in the Porcupine River drainage (Sheenjek River in Alaska and Fishing Branch River in Canada), Chandalar River in Alaska, Tanana River drainage in Alaska (Toklat River, Delta River, and mainstem Tanana upstream of

Fairbanks) and the upper Yukon River drainage in Canada (Kluane River and mainstem Yukon River). Spawning occurs during September through November.

Tagging studies conducted in the 1970's indicated Porcupine River and upper Yukon River fall chums are distinguished from Tanana River fall chums by their earlier run timing and their orientation along the north bank of the Yukon River in the Ruby area (mile 530-700), as opposed to the south bank orientation of Tanana drainage fall chums.

In the lower Yukon area the majority of the fall chum salmon is used for commercial purposes while in the upper Yukon area an increased proportion of fall chum salmon is utilized for subsistence. Increased total utilization (commercial and subsistence catch combined) of fall chum salmon in Alaska occurred through 1985. For the period 1981-1985 catches averaged 477,000 fish, an increase of 20% compared to the previous 5-year average (1976-1980) of 398,000 fish (Tables 2 and 3). This was due to an increase of 37% and 13% for subsistence and commercial fisheries, respectively, from the 1976-1980 average catch to the 1981-1985 average catch. During these same periods Canadian total utilization of Yukon River fall chum salmon increased 93% (Table 4).

There has been a serious decline in fall chum salmon escapements in recent years (especially 1982-1984) for most of the major spawning areas (Figure 2 and Table 8). Average escapement in the Sheenjek, Fishing Branch, Toklat, and Delta Rivers for the period 1982-1984 were 40%, 60%, 59%, and 25%, respectively, below escapement objectives.

In response to poor escapements in recent years, difficulties in assessing in-season run strength, and the increasing efficiency of the fleet, the Alaska Board of Fisheries has adopted several

regulatory restrictions beginning in 1983. Initially, these restrictions included a commercial fishery closure during late July in the lower Yukon area to protect the early portion of the run, establishment of a coastal "Set-Net-Only Area" which prohibited drift net operation, establishment of emergency order authority to implement fishing periods, and a reduction in commercial fishing time. For the 1986 season on a trial basis, and extended for the 1987 season by regulation, the Alaska Board of Fisheries established a more restrictive Fall Chum Salmon Management Plan. These regulations provided for fishery closures by date at the end of the summer season, emergency order authority to establish seasons and fishing periods, reduced guideline harvest ranges, reduced commercial fishing time, and provided for no commercial fishing unless the run was determined to be average or better in magnitude.

Coho Salmon

Coho salmon enter the river during August and early September. Escapement information is very limited. Comparative escapement information for this species is available only from the Tanana River drainage, where escapements appear to have been relatively stable during the last 10 years (Table 9). The Delta Clearwater River near Delta Junction supports the largest known population within the Yukon drainage.

The commercial harvest of coho salmon in the lower Yukon area is dependent upon the timing and duration of the fall chum season. Coho migration in the lower river peaks during mid to late August. Coho salmon are taken incidentally to the fall chum fishery in most districts, but in some years contribute substantially to the commercial and subsistence harvests. Commercial catches in the Yukon area during the period 1982-1986 have averaged approximately 47,500 coho salmon (Table 2). Approximately 35,000 cohos are also taken annually (recent 5-year average) for subsistence (Table 3).

1987 SEASON SUMMARY

Area Summary

In 1987 a total of 574,209 salmon was commercially harvested in Alaska. The catch was composed of 131,971 chinook, and 442,238 summer chum salmon (Table 5). Additionally, 122,259 lbs summer chum salmon roe was harvested. No commercial fishery was allowed for fall chum or coho salmon during 1987. The chinook salmon catch was 3% above the recent 5-year average (1982-1986), the summer salmon catch and roe harvest were 27% and 38%, respectively, below the recent 5-year average. The commercial harvest by Canada was 10,701 chinook salmon 3% below their recent 5-year average, and 40,000 fall chum salmon, 86% above their recent 5-year average (Table 4).

Yukon River fishermen in Alaska received an estimated $7,161,500 for their catch, a 26% increase from the recent 5-year average. Ten buyer-processors operated in the lower Yukon area, and 17 buyer-processors and registered catcher-sellers operated in the upper Yukon area of Alaska.

In 1987, lower Yukon fishermen received an average price of $1.98 per lb for chinook salmon, and $0.48 per lb for summer chum salmon. Upper Yukon commercial fishermen received an estimated per-pound average price of $0.79 for chinook salmon, $0.19 for summer chum salmon, and $2.22 for salmon roe.

Subsistence harvest survey information is still being compiled, but it is projected that the Alaskan catch will approximate 45,000 chinook salmon, 225,000 summer chum salmon, 175,000 fall chum salmon, and 35,000 coho salmon (Table 3).

Chinook Salmon

The lower Yukon River was generally free of ice 30 May. Chinook salmon migratory timing into the lower river appeared to be average. The lower river commercial fishery was opened by emergency order after approximately 9 days of increasing subsistence and test net catches in the lower river. The fishing season was opened on a staggered basis in lower river districts: 15 June in District 1, 17 June in District 2, and 21 June in District 3. A fishing schedule of two 24-hour periods per week was established with provisions incorporated to reduce fishing time if the catch exceeded a level beyond which run strength could support.

The first three periods in Districts 1 and 2 were allowed to occur as initially scheduled, after which the combined harvest for the two districts was approximately 83,000 chinook salmon. At that time it was determined that the chinook salmon return was above average in magnitude based on cumulative test net indices and hydroacoustic enumeration. Although the midpoint of the guideline harvest range had not been reached it was warranted to reduce the next fishing periods in Districts 1 and 2 from 24 hours in duration to 12 hours. This action was taken in consideration of the guideline harvest range, harvest to date, the harvest from scheduled fishing periods, and the anticipated incidental harvest of chinook salmon during subsequent restricted mesh size fishing periods. Following the fourth unrestricted mesh size fishing period in Districts 1 and 2 the combined chinook salmon harvest was 102,274 fish. Restrictions were then implemented to allow for the use of gill nets of 6-inch maximum mesh size to direct harvest toward summer chum salmon. Three additional commercial fishing periods of six to 24-hours in duration were allowed in both Districts 1 and 2 between 29 June and 10 July. An additional 21,827 chinook salmon were harvested

during these restricted mesh size periods, which was twice the recent 5-year average (1982-1986) for the same time period. The total District 1 and 2 catch was 121,101 fish, 3% above the upper end of the guideline harvest range and 4% above the recent 5-year average. Comparative test net catch data indicated that the 1987 chinook salmon return was most similar to the 1981 return from which 145,278 fish were harvested. During 1981 good spawning area escapements were documented throughout the Yukon River drainage.

In District 3 a total of three unrestricted mesh size fishing periods (two 24-hour, one 12-hour) and one restricted mesh size fishing period (24-hour) was allowed 21 June - 2 July. The initial delay in opening District 3 allowed the first segment of the chinook salmon return to pass through the district prior to commercial fishing. A total of 2,039 chinook salmon was harvested from District 3, which was approximately the midpoint of the guideline harvest range, and 23% below the recent 5-year average (1982-1986).

In Districts 4, 5, and 6, (upper Yukon area) the commercial fishing season opened as established by regulation. Fishery closures we e established by emergency order authority except within one subdistrict (4A) of District 4 which closed by regulation on 1 August. Emergency order closures became effective on 1 August in the remainder of District 4 (subdistricts 4B and 4C), 11 July in a portion of District 5 (subdistricts 5A, 5B, and 5C), 20 July in the remainder of District 5 (subdistrict 5D), and 14 August in District 6. In District 6, commercial (21 July - 12 August) and subsistence (31 July - 7 August) fishing closures were implemented in response to harvest levels and spawning area escapement requirements. The subsistence closure affected that portion of the district from the mouth of the Chena River to the mouth of the Salcha River. The subsistence closure was in response to unexpectedly low

numbers of spawning chinook salmon documented by aerial surveys on 24 and 27 July. Additionally, department gill net and sport fish creel census data from the Salcha River indicated a weak Salcha River return.

The total upper Yukon area commercial chinook salmon harvest was 5,831 fish, slightly below the midpoint of the combined districts guideline harvest range (5,550-6,950) and 6% above the recent 5-year average (1982-1986). The harvest of chinook salmon in Districts 4 and 5 was 4,629 fish, 25% below the combined districts guideline harvest range (4,950-6,150) and 4% above the recent 5-year average (1982-1986).

In-season chinook salmon abundance indicators including lower river cumulative test net catches, sonar enumeration, districts 4 and 5 cumulative commercial harvests, and reported subsistence catches, identified a return of above average magnitude. However the strength of chinook salmon spawning escapements in 1987 was variable between spawning areas in the lower, middle, and upper portions of the Yukon River drainage. Spawning escapements were generally near or above objective levels in the lower Yukon River tributaries, and below objective in Tanana River tributaries and in Canadian spawning areas.

Spawning escapement survey counts of 3,281 chinook salmon for the West Fork Andreafsky River, 1,608 for the East Fork, and 1,179 for the Anvik River achieved the objectives for each of these spawning areas (Table 3). The West Fork count was the largest ever recorded, while a counting tower estimate of 2,011 chinook salmon was obtained for the East Fork. Counts of 1,128 chinook salmon for the North Fork and 493 for the South Fork of the Nulato River met the escapement objective of 500 fish for each fork. Historical survey data are sporadic for the Gisasa River, in the Koyukuk River drainage, but 731 chinook salmon were counted by aerial survey in 1987. Escapement objectives were not

achieved in the Chena and Salcha Rivers, the major producers in the Tanana River drainage, which had peak survey counts of 1,312 and 1,898 chinook salmon, respectively.

In contrast to the Alaska portion of the drainage but similar to 1986, chinook spawning escapements in Canadian Yukon tributaries were below desired levels. A total of 327 chinook was enumerated at the Whitehorse fishway which compared poorly with both the 1986 count of 541 and recent 5-year average of 669 fish (1982-1986). Aerial surveys of the principle index area of the Nisutlin River resulted in a peak count of 183 fish compared to the recent 5-year average of 595 chinook salmon.

Surveys of other Teslin tributaries (Morley, Wolf, and Swift Rivers) all indicated a poor escapement to this drainage. However, this trend was not consistently observed throughout other Canadian chinook salmon spawning streams. For example, aerial survey evaluation of the Big Salmon (1,121 fish) and Little Salmon Rivers (468 fish) were somewhat above average, and above the 1986 comparative data. In contrast the 1987 Big Salmon weir count of 998 was approximately one half the 1986 count. Approximately the same number of chinook salmon were seen in Tatchum Creek in 1987 (159 fish) compared to 1986.

Chinook salmon spawning escapement in the Canadian portion of the mainstem Yukon River was estimated at 21,500 fish (preliminary) based on DFO mark and recapture study. This is above recent estimates for 1985 (11,000 fish) and 1986 (17,000 fish), although it is about 40% below the midpoint of the interim spawning escapement objective (33,000-43,000).

Summer Chum Salmon

Summer chum salmon run strength was below average, with average migratory run timing. Summer chum salmon directed fishing

periods were implemented in the lower Yukon area after termination of the chinook salmon directed fishery. Three restricted mesh size fishing periods (6-inch maximum mesh size) were allowed in Districts 1 and 2 and a single period was allowed in District 3 between 29 June and 10 July. Due to below average summer chum salmon run strength, fishing period duration and frequency were significantly reduced from prior years. This was the first time in the history of the summer chum salmon fishery that fishing periods were reduced or eliminated. The lower Yukon area summer chum salmon harvest was 401,275 fish, 28% below the recent 5-year average (1982-1986) and the lowest since 1977.

The upper Yukon area summer chum salmon harvest was 40,963 fish and 122,259 lbs roe, 16% and 38% below the recent 5-year averages (1982-1986), respectively. In response to below average summer chum salmon run strength, commercial fishing restrictions implemented in Districts 4 and 6. Fishing time in District 4 reduced from two 48-hour periods per week to a single 48- period per week beginning 7 July and continuing through the of the season. Additionally, on achievement of the Distric chinook salmon commercial harvest guideline, the district closed with the closure extended in duration from recent years afford additional protection to summer chum salmon.

Summer chum salmon spawning escapements were below objecti levels in 1987 (Table 7). The East Fork Andreafksy River tow count estimate of 45,221 summer chum salmon was 67% below t average of 135,400 fish since 1981. An aerial survey count c 35,535 summer chum salmon for the West Fork Andreafksy River wa well below the objective of 116,000 fish. Sonar estimate escapement of 455,876 summer chum salmon in the Anvik River wa 6% below the escapement objective of 487,000 fish, and 27% below the 1972-1986 average of 628,000 fish. The aerial survey count of 11,257 summer chum salmon for the Nulato River (both forks and mainstem combined) was well below the objective of 53,000 fish

for the North Fork alone. Spawning escapement to the Salcha River was at the objective level based on an aerial survey count of 3,657 fish, but 34% below the 1982-1986 average.

Fall Chum and Coho Salmon

In anticipation of a poor return of fall chum salmon, regulation changes implemented for the 1986 season were again adopted for the 1987 season. This action provided for a conservative management plan consisting of decreased harvest guidelines, shorter fishing periods and a season closure. The fishing season closed 10 July in the lower Yukon area due to conservation measures taken during the summer chum salmon directed fishery. A continuation of the mid-season closure was necessary to afford increased protection to the early run segment of fall chum salmon and to assess run strength.

In-season evaluation of the 1987 return of fall chum salmon indicated that the return was not of sufficient magnitude to provide for a commercial fishery, although it would provide for achievement of spawning area escapement objectives and a subsistence harvest similar to prior years. Coho salmon, which exhibit later run timing, are generally taken incidental to the more abundant fall chum salmon. No commercial fishery was allowed for coho salmon since fall chum salmon run strength was determined to be at a level which would not allow incidental harvest. Run size evaluation techniques included lower Yukon test net cumulative catch rates, hydroacoustic evaluation, Ruby test fishwheel cumulative catch rates, and subsistence catch monitoring.

The early portion of the fall chum salmon migration was weak, with the first major pulse of salmon entering the river from 30 July to 1 August. The entry of fall chum salmon into the lower river remained fairly stable at low to moderate levels after this

time through the end of August. Evaluation of prior year test net catch data indicated that during recent years 40-60% of the fall chum salmon return had entered the lower river by 3 August. An in-season total return estimate was made on 4 August indicating the 1987 return was most similar to returns during which escapement objectives were not met. Although the 3 August test net catch was relatively good, catches dropped off 4 August and remained at low levels through 7 August. It was determined on 7 August, based on an assessment of the Main River sonar fish passage estimate, that the total Yukon River fall chum salmon return would be between 444,000-667,000 fish. A total fall chum salmon return toward the lower end of the range was considered to be the best estimate based on relative run timing information and the preseason projection. To insure achievement of spawning area escapement objectives and subsistence harvest levels similar to recent year averages, the decision was made and announced on 7 August that no further commercial salmon fishing would be allowed in the lower Yukon area during the 1987 season.

Ruby (river mile 594) test fishwheel catch data supported and reinforced the assessment of fall chum salmon run size obtained form the lower river. However, subsistence catch reports from District 5 fishermen indicated the run was of greater strength than determined by department programs. Given the Department's demonstrated tendency to overestimate run strength and the overriding need to satisfy spawning ground escapement requirements, a decision was made to allow no commercial harvest in Districts 4 and 5.

Fall chum salmon postseason escapement information indicates that the 1987 return was increased in abundance from years during which spawning area escapements were below objective (1982, 1984, and 1986) (Table 8). Escapements to the Delta, Toklat, Sheenjek, and Fishing Branch Rivers combined were 56% above the combined escapement objective for these systems. On an individual basis

the Sheenjek and Delta Rivers were more than double the escapement objective while the Toklat River escapement was 33% below objective. The Fishing Branch River escapement was 2% below the lower end of the objective range (50,000-120,000 fish). Fall chum salmon escapement into the Canadian portion of the mainstem Yukon River was estimated at 81,000 fish (preliminary) based on DFO mark and recapture study. This is above the 1985 estimate (59,000 fish), below the 1986 estimate (88,000 fish) and 10% below the lower end of the interim spawning escapement objective (90,000-135,000 fish).

Limited coho salmon escapement information is obtained annually. During 1987 aerial surveys of three spawning index areas were conducted, at the time of this report. Escapements were well above average in areas surveyed (Table 9).

OUTLOOK FOR 1988

Chinook Salmon

The majority of chinook salmon returning to the Yukon River are 6-year-old fish, however, 5- and 7-year-old fish make a significant contribution to the run. The 1982 brood year (6-year-olds in 1988) was judged average to below average in abundance as judged by comparative escapement information. Survival and production by the 1982 brood year is apparently below average based on preliminary findings of lower than normal contribution of 5-year-old fish to the 1987 return. It is expected that the 1988 return of 5-year-olds (1983 brood year) will be near average based on 1983 run strength and escapements. The return of 7-year-old fish (1981 year class) is expected to be above average as the return of this year class in 1986 as 5-year-olds and 1987 as 6-year-olds was above average. Overall, the 1988 chinook salmon run is anticipated to be below average in strength, similar in abundance and age structure to the 1986

return. The commercial harvest in Alaska is expected to total 70,000 to 100,000 fish.

Summer Chum Salmon

Yukon River summer chum salmon return primarily as 4-year-old fish, although substantial 5-year-old returns often result from good brood survival years. The return of 4-year-old fish in 1988 will be dependent on production from the 1984 brood year and survival of the resulting cohort. Based on available catch and limited escapement data, the magnitude of the 1984 summer chum run was judged above average in abundance. The return of 5-year-olds in 1988 is expected to be below average in strength based on the poor return of 4-year-old fish in 1987. In summary, based on evaluation of brood year run size data and assuming average survival, it is expected that the Yukon River summer chum salmon return in 1988 will be average to above average in magnitude. The commercial harvest is expected to be similar to the recent 5-year average (600,000 fish and 190,000 lbs roe).

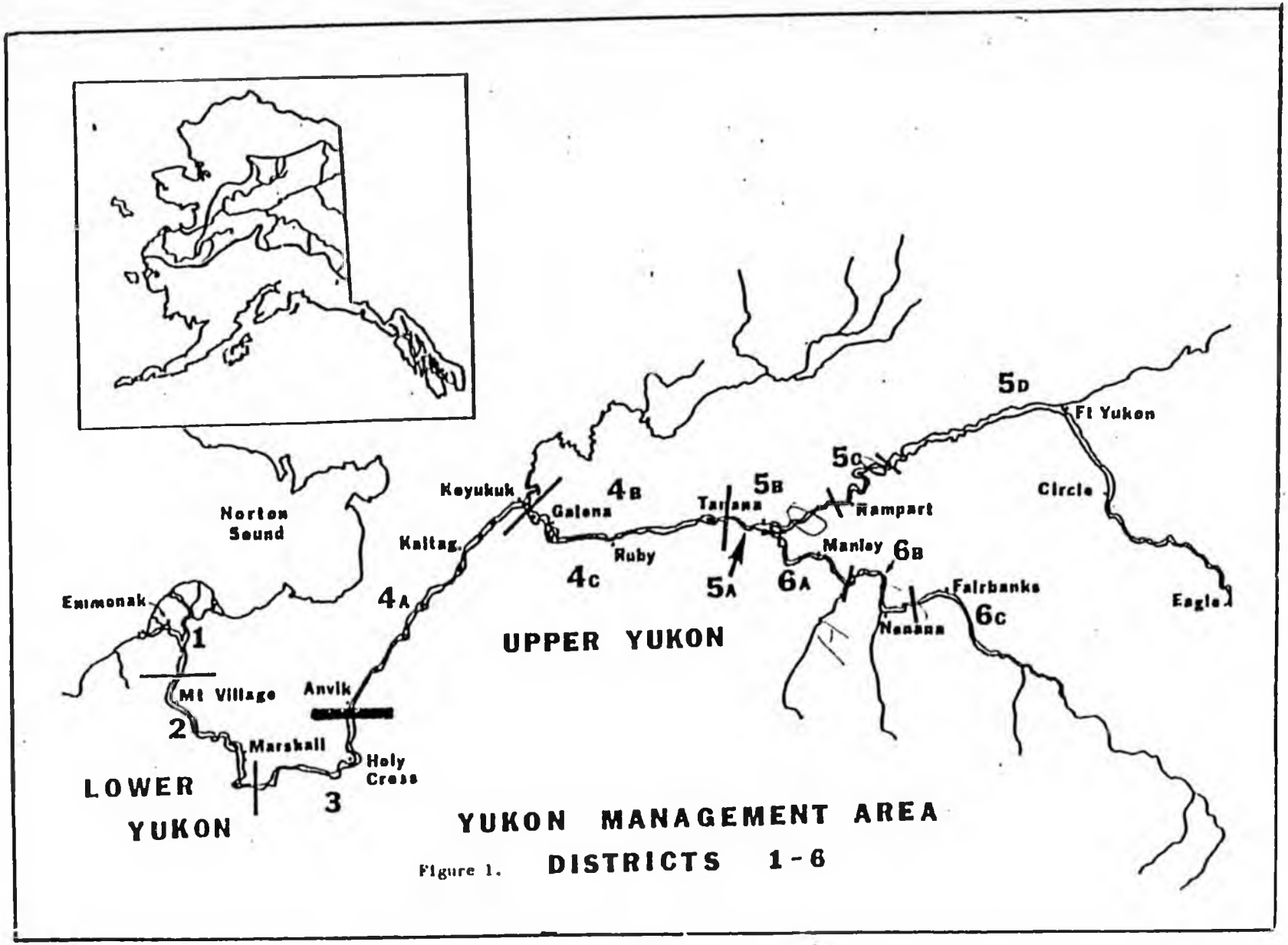
$\equiv \sim 300K$ fish $\therefore TH = 900K$

Fall Chum Salmon

Similar to the summer run, fall chum salmon return primarily as 4-year-old fish. Escapements in 1984 (which will produce 4-year-olds in 1988) were below average. The return of 5-year-olds (1983 brood year) is expected to be average to below average based on the number of 4-year-olds in 1987. In summary, based on evaluation of brood year escapements and assuming average survival, a below average return of fall chum salmon is expected in 1988. A projection of the fall chum salmon return, based on an estimate of total parent year escapements, the average maturity schedule and expected returns per spawner, indicates a limited commercial fishery may be allowed during 1988. The commercial harvest in Alaska is expected to total 0-80,000 fish.

Coho Salmon

Coho salmon return primarily as 4-year-old fish. Comprehensive escapement information for coho salmon is lacking, but escapement surveys in the Tanana River system indicated above average run strength in 1984. The proportion of 3-year-old fish in 1987 test fish catch samples further suggests the 1988 return of coho salmon will be above average in magnitude. The commercial harvest in Alaska will be dependent on the timing and frequency of fishing periods allowed for fall chum salmon, but is expected to be 0-50,000 fish.


Norton Sound
Koyukuk
Galena
Ruby
Tanana
Rampart
Manley
Fairbanks
Nenana
Eagle
Circle
Ft Yukon
Kaltag
Emmonak
Mt Village
Anvik
Marshall
Holy Cross
4A
4B
4C
5A
5B
5C
5D
6A
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1
2
3
LOWER YUKON
UPPER YUKON
YUKON MANAGEMENT AREA
DISTRICTS 1-6

Figure 1.

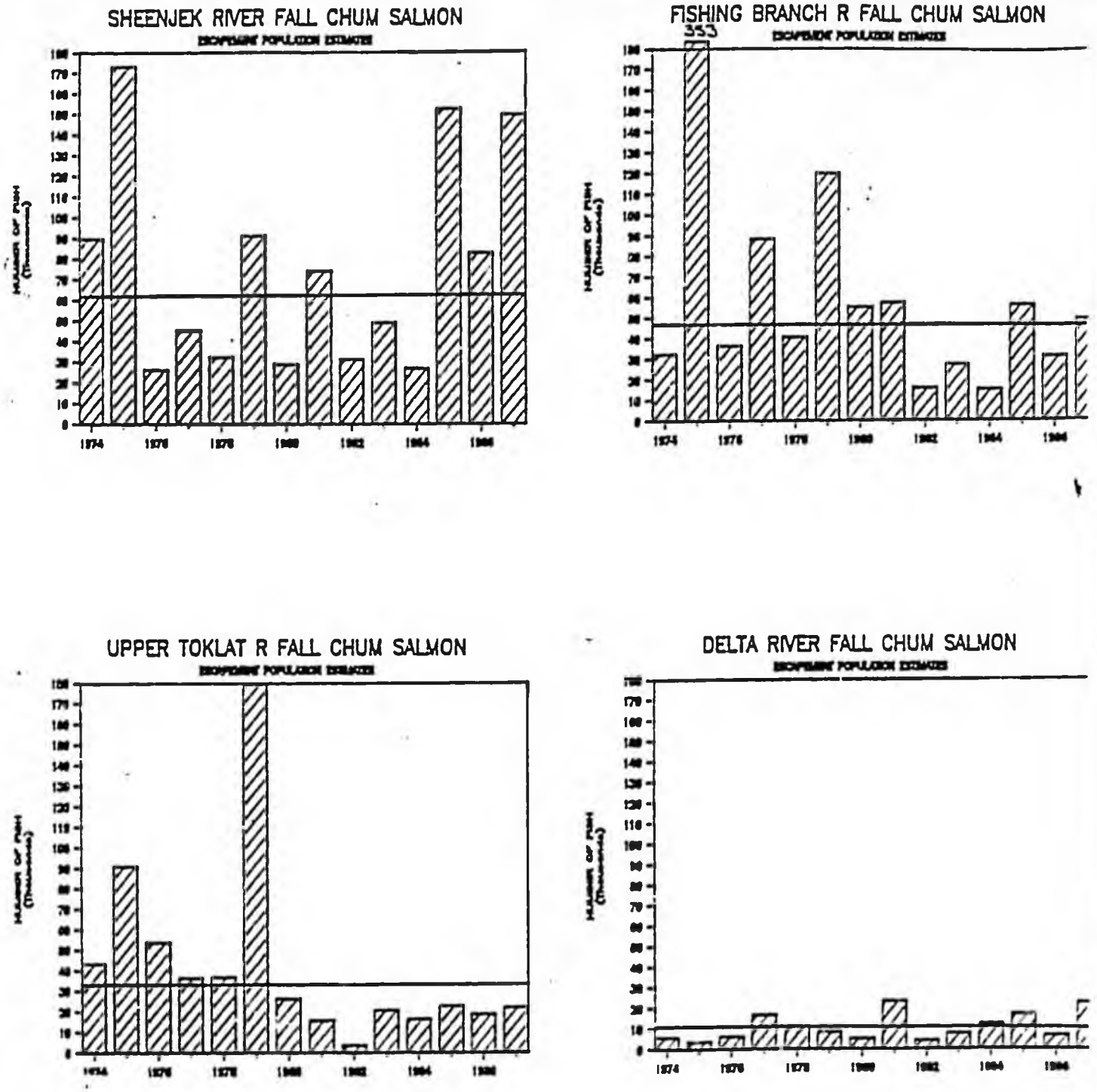

Figure 2. Fall chum salmon expanded escapement population estimates for four selected Yukon River spawning areas, 1974-1987.

Table 1. Total utilization (Alaska and Canada) of Yukon River salmon, 1961-1987.

Year	Chinook	Summer Chum a	Fall Chum a,b	Coho a,b	Total
1961	154,398	305,317	144,233	12,047	615,995
1962	119,781	261,856	140,401	32,456	554,494
1963	151,987	297,094	99,031	33,271	581,383
1964	117,226	361,080	128,707	14,633	621,646
1965	140,086	336,848	135,600	12,139	624,673
1966	109,339	154,508	122,548	32,446	418,841
1967	151,254	217,168	107,018	28,211	503,651
1968	123,674	148,350	97,552	24,916	394,492
1969	107,651	218,157	183,373	22,869	532,050
1970	97,682	303,510	265,096	17,154	683,442
1971	142,638	271,577	246,756	29,115	690,086
1972	118,827	243,674	188,178	29,765	580,444
1973	104,192	446,521	285,760	46,877	883,350
1974	123,684	817,703	383,552	28,423	1,353,362
1975	82,883	922,183	361,600	23,254	1,389,920
1976	110,607	787,766	228,717	10,425	1,137,515
1977	121,865	694,377	340,757	55,196	1,212,195
1978	135,346	1,266,283	340,816	33,949	1,776,394
1979	169,053	1,010,820	615,377	26,959	1,822,209
1980	219,255	1,288,284	488,305	28,903	2,024,747
1981	205,517	1,397,330	677,257	44,908	2,325,012
1982	168,710	839,238	373,175	73,070	1,454,193
1983	216,040	1,144,649	525,018	37,215	1,922,922
1984	178,827	1,040,299	412,322	130,960	1,762,408
1985	204,960	1,091,757	515,481	89,936	1,902,134
1986	165,316	1,371,250	318,312	81,725	1,936,603
1987 c	194,172	800,000	219,500	35,000	1,248,672
5 Yr Avg 1977-81	170,207	1,131,419	492,502	37,983	1,832,111
5 Yr Avg 1982-86	186,771	1,097,439	428,862	82,581	1,795,652

a Alaskan subsistence catches estimated for 1961-1976 since catches of salmon other than chinook salmon were not differeniated by species until 1977.
b Minimum estimates for 1961-1978 because subsistence surveys were typically conducted well before the end of the fishing season.
c Preliminary estimates.

Table 2. Alaskan commercial catch of Yukon River salmon, 1961-1987. a

Year	Chinook	Summer Chum		Fall Chum		Coho	Total	
		Numbers	Roe	Numbers	Roe		Numbers	Roe
1961	119,664	-	-	42,461	-	2,855	164,980	-
1962	94,734	-	-	53,116	-	22,926	170,776	-
1963	117,048	-	-	0	-	5,572	122,620	-
1964	93,587	-	-	8,347	-	2,446	104,380	-
1965	118,098	-	-	23,317	-	350	141,765	-
1966	93,315	-	-	71,045	-	19,254	183,614	-
1967	129,656	10,935	-	38,274	-	11,047	189,912	-
1968	106,526	14,470	-	52,925	-	13,303	187,224	-
1969	91,027	61,966	-	131,310	-	15,093	299,396	-
1970	79,145	137,006	-	209,595	-	13,188	438,934	-
1971	110,507	100,090	-	189,594	-	12,203	412,394	-
1972	92,840	135,668	-	152,176	-	22,233	402,917	-
1973	75,353	285,509	-	232,090	-	36,641	629,593	-
1974	98,089	589,892	-	289,776	-	16,777	994,534	-
1975	63,838	710,295	-	275,009	-	2,546	1,051,688	-
1976	87,776	600,894	-	156,390	-	5,184	850,244	-
1977	96,757	534,875	-	257,986	-	38,863	928,481	-
1978	99,168	1,052,226	25,761	236,383	10,628	26,152	1,413,929	36,389
1979	127,673	779,316	40,217	359,946	18,466	17,165	1,284,100	58,683
1980	153,985	928,609	139,106	293,430	5,020	8,745	1,384,769	144,126
1981	158,018	1,006,938	189,068	466,451	11,285	23,680	1,655,087	200,353
1982	123,644	461,403	152,819	224,187	805	37,176	846,410	153,624
1983	147,910	744,879	149,999	302,598	5,064	13,320	1,208,707	155,063
1984	119,904	588,597	167,224	208,232	2,328	81,940	998,673	169,552
1985	146,188	516,997	248,625	267,744	2,525	57,672	988,601	251,150
1986	99,970	721,469	271,691	139,442	577	47,255	1,008,136	272,268
1987	131,971	442,238	122,259	0	0	0	574,209	122,259
5 Yr Avg 1982-86 Alaska	127,523	606,669	198,072	228,441	2,260	47,473	1,010,105	200,331
5 Yr Avg 1982-86 Lower Yukon	122,028	557,574	0	172,991	0	40,295	892,888	0
5 Yr Avg 1982-86 Upper Yukon	5,495	49,095	198,072	55,450	2,260	7,178	117,218	200,331

a Catches reported in numbers of fish sold in the round and pounds of unprocessed roe.

Table 3. Alaskan subsistence catch of Yukon River salmon, 1961-1987.

Year	Chinook	Summer Chum a	Fall Chum a,b	Coho a,b	Total
1961	21,488	305,317	101,772	9,192	437,769
1962	11,110	261,856	87,285	9,480	369,731
1963	24,862	297,094	99,031	27,699	448,686
1964	16,231	361,080	120,360	12,187	509,858
1965	16,608	336,848	112,283	11,789	477,528
1966	11,572	154,508	51,503	13,192	230,775
1967	16,448	206,233	68,744	17,164	308,589
1968	12,106	133,880	44,627	11,613	202,226
1969	14,000	156,191	52,063	7,776	230,030
1970	13,874	166,504	55,501	3,966	239,845
1971	25,684	171,487	57,162	16,912	271,245
1972	20,258	108,006	36,002	7,532	171,798
1973	24,317	161,012	53,670	10,236	249,235
1974	19,964	227,811	93,776	11,646	353,197
1975	13,045	211,888	86,591	20,708	332,232
1976	17,806	186,872	72,327	5,241	282,246
1977	17,581	159,502	82,771	16,333	276,187
1978	30,297	197,137	94,867	7,797	330,098
1979	31,005	196,187	233,347	9,794	470,333
1980	42,724	272,398	172,657	20,158	507,937
1981	29,690	208,284	188,525	21,228	447,727
1982	28,158	260,969	132,897	35,894	457,918
1983	49,478	240,386	192,930	23,895	506,689
1984	42,428	230,747	174,823	49,020	497,018
1985	39,771	264,828	206,472	32,264	543,335
1986	45,282	290,888	164,034	34,470	534,674
1987 c	45,000	225,000	175,000	35,000	480,000
5 Yr Avg 1982-86 Alaska	41,023	257,564	174,231	35,109	507,927
5 Yr Avg 1982-86 Lower Yukon	14,019	59,187	23,303	13,536	110,045
5 Yr Avg 1982-86 Upper Yukon	27,004	198,377	150,928	21,573	397,882

a Catches estimated for 1961-1976 since catches of salmon other than chinook salmon were not differentiated by species until 1977.
b Minimum estimates for 1961-1978 because surveys were typically conducted well before the end of the fishing season.
c Preliminary estimates.

Table 4. Canadian catch of Yukon River chinook and fall chum salmon, 1961-1987.

	Chinook			Fall Chum		
Year	Commercial	Non-Commercial a	Total	Commercial	Non-Commercial a,b	Total
1961	3,446	9,800	13,246	3,276	5,800	9,076
1962	4,037	9,900	13,937	936	8,500	9,436
1963	2,283	7,794	10,077	2,196	25,500	27,696
1964	3,208	4,200	7,408	1,929	10,258	12,187
1965	2,265	3,115	5,380	2,071	9,718	11,789
1966	1,942	2,510	4,452	3,157	10,035	13,192
1967	2,187	2,963	5,150	3,343	13,618	16,961
1968	2,212	2,830	5,042	453	11,180	11,633
1969	1,640	984	2,624	2,279	5,497	7,776
1970	2,611	2,052	4,663	2,479	1,232	3,711
1971	3,178	3,269	6,447	1,761	15,150	16,911
1972	1,769	3,960	5,729	2,532	5,000	7,532
1973	2,199	2,323	4,522	2,806	7,329	10,135
1974	1,808	3,823	5,631	2,544	9,102	11,646
1975	3,000	3,000	6,000	2,500	18,100	20,600
1976	3,500	1,525	5,025	1,000	4,200	5,200
1977	4,720	2,807	7,527	3,990	8,489	12,479
1978	2,975	2,906	5,881	3,356	6,210	9,566
1979	6,175	4,200	10,375	9,084	13,000	22,084
1980	9,500	13,046	22,546	9,000	13,218	22,218
1981	8,593	9,216	17,809	15,260	7,021	22,281
1982	8,640	8,268	16,908	11,312	4,779	16,091
1983	13,027	5,625	18,652	25,990	3,500	29,490
1984	9,885	6,610	16,495	22,932	6,335	29,267
1985	12,573	6,428	19,001	35,746	5,519	41,265
1986	10,797	9,267	20,064	11,464	3,372	14,836
1987 c	10,701	6,500	17,201	40,000	4,500	44,500
5 Yr Avg 1982-86	10,984	7,240	18,224	21,489	4,701	26,190

a Indian Food Fish and Domestic fisheries combined.
b Includes small numbers of coho salmon taken at Old Crow.
c Preliminary estimates.

Table 5. Alaskan commercial catch of Yukon River salmon in 1987.

District Subdist.	No. of Fishermen	Chinook	Summer Chum		Fall Chum		Coho	Total Salmon	
			Numbers	Roe (lbs) a	Numbers	Roe (lbs)		Numbers	Roe (lbs)
1	440	76,643	222,898	0	0	0	0	299,541	0
2	239	47,458	174,876	0	0	0	0	222,334	0
Subtotal	656	124,101	397,774	0	0	0	0	521,875	0
3	13	2,039	3,501	0	0	0	0	5,540	0
Total Lower Yukon	659	126,140	401,275	0	0	0	0	527,415	0
4 A	67	91	29,314	110,977	0	0	0	29,405	110,977
4 B,C	29	1,433	677	10,497	0	0	0	2,110	10,497
Subtotal District 4	87	1,524	29,991	121,474 b	0	0	0	31,515	121,474
5 A,B,C	27	2,539	362	44	0	0	0	2,901	44
5 D	3	566	0	0	0	0	0	566	0
Subtotal District 5	30	3,105	362	44	0	0	0	3,467	44
6	25	1,202	10,610	741	0	0	0	11,812	741
Total Upper Yukon	141	5,831	40,963	122,259	0	0	0	46,794	122,259
Total Yukon Area	800	131,971	442,238	122,259	0	0	0	574,209	122,259

a May include small amount of chinook salmon roe.

b 121,474 lbs of roe equals 121,474 females (1 lb roe/female). Including males not sold, it is estimated that 209,800 summer chum salmon were harvested during roe directed fishery.

1.7

Table 6. Chinook salmon escapement counts for selected spawning areas in the Yukon River drainage, 1959-1987. a

Year	Andreafsky E. Fork	Andreafsky W. Fork	Anvik Aerial	Anvik Tower	Nulato	Chena	Salcha	Big Salmon	Nisutlin	Whitehorse Fishway	Canada Mainstem Tagging
1959	-	-	-	-	-	-	-	-	-	1,054	-
1960	1,020	1,220	1,950	-	756	132 d	1,660	-	-	660	-
1961	1,003	-	1,226	-	543 d	-	2,878	-	-	1,068	-
1962	675 d	762 d	-	-	-	-	937	-	-	1,500	-
1963	-	-	-	-	-	137 d	-	-	-	484	-
1964	867	705	-	-	-	-	450	-	-	587	-
1965	-	355 d	650 d	-	-	-	408	-	-	903	-
1966	361	303	638	-	-	-	800	-	-	563	-
1967	-	276	336 d	-	-	-	-	-	-	533	-
1968	380	383	310 d	-	-	-	739	827 d	407	414	-
1969	231 d	274 d	296 d	-	-	-	461 d	286 d	105 d	334	-
1970	665	574 d	368	-	-	-	1,882	670	615	625	-
1971	1,904	1,682	-	-	-	193 d,e	158 d	200 d	650	856	-
1972	798	582 d	-	1,198	-	138 d,e	1,193	560	237	391	-
1973	825	788	-	613	-	21 d	391	75 d	36 d	224	-
1974	-	285	-	471 d	78 d	1,035 e	1,857	70 d	150 d	273	-
1975	993	301	-	730	204	316 e	1,055	153 d	239	313	-
1976	818	643	-	1,154	648	531	1,641	86 d	102	121	-
1977	2,008	1,499	-	1,371	487 d	563	1,202	316 d	77 d	277	-
1978	2,487	1,062	-	1,324	920	1,726	3,499	524	375	725	-
1979	1,180	1,134	-	1,484	1,507	1,159 d	4,789	632	713	1,184	-
1980	958 d	1,500	1,330	-	1,323 d	2,541	6,757	1,568	975	1,383	-
1981	2,146 d	231 d	807 d	-	791 d	600 d	1,237 d	2,411	1,626	1,539	-
1982	1,274	851 d	-	-	-	2,073	2,534	757	578	473	20,200
1983	-	-	653 d	-	1,006	2,553	1,961	540	701	905	29,500
1984	1,573 d	1,993	641 d	-	-	501	1,031	1,044	832	1,042	-
1985	1,617	2,248	1,051	-	2,780	2,553	2,035	801	409	536	10,800
1986	1,954	3,158	1,118	-	2,974	2,031 d	3,368	745	459 d	541	17,500
1987	2,011 d,f	3,281	1,179	-	1,638	1,312 d	1,898	1,121	183	327	21,500 g

a Data obtained by aerial survey unless otherwise noted. Only peak counts are listed.
b Big Salmon Lake - Souch Cr.
c Sidney Cr. - 100 Mile Cr.
d Incomplete survey and/or poor survey timing or conditions resulted in minimal or inaccurate count.
e Boat survey.
f Tower count.
g Preliminary estimate.

Table 7. Summer chum salmon escapement counts for selected spawning areas in the Yukon River drainage, 1973-1987. a

	Andreafsky			Anvik				
	E. Fork			Tower and				
Year	Aerial	Sonar	W. Fork	Aerial	Sonar	Nulato	Hogatza	Salcha
1973	10,149 b	-	51,835	86,665 b	-	-	-	-
1974	3,215 b	-	33,578	201,277	-	51,160	-	3,510
1975	223,485	-	235,954	845,485	-	138,495	22,355	7,573
1976	105,347	-	118,420	406,166	-	40,001 b	20,744	6,474
1977	112,722	-	63,120	262,854	-	69,660	10,734	677 b
1978	127,050	-	57,321	251,339	-	54,480	5,102	5,405
1979	66,471	-	43,391	-	280,537	37,104	14,221	3,060
1980	36,823 b	-	115,457	-	492,676	14,946 b	19,786	4,140
1981	81,555	147,312	-	-	1,479,582	14,348 b	-	8,500
1982	7,501 b	181,352	7,267 b	-	444,581	-	4,984 b	3,756
1983	-	110,608	-	-	362,912	21,012 b	28,141	716 b
1984	95,200 b	70,125	238,565	-	891,028	-	-	9,810
1985	66,146	-	52,750	-	1,080,243	29,838	22,566	3,178
1986	83,931	167,614 c	99,373	-	1,189,602	64,265	-	8,028
1987	-	45,221 c	35,535	-	455,876	11,257	5,669 b	3,657

a Data obtained by aerial survey unless otherwise noted. Only peak counts are listed.
b Incomplete survey and/or poor survey timing or conditions resulted in minimal or inaccurate count.
c Tower count.

Table 8. Fall chum salmon escapement estimates for selected spawning areas in the Yukon River drainage, 1974-1987. a

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987 s
TANANA RIVER DRAINAGE														
Upper Toklat River b	34,310	42,418 c	35,190	21,800 c	35,000	96,550 d	23,054	13,907	3,309 e	15,105 e	15,861	21,824 d	12,708 d	18,000 d
Lower Toklat River	--	35,867 c	(2,000) d	--	--	64,540	(2,140)	--	--	--	--	--	--	--
Upper Tanana River														
Benchmark #735 Slough	1,450 c	--	336	1,270	1,705 c	2,714	1,900 e	168 c	--	--	--	1,093	--	--
Delta River	1,010	3,734 h	6,312 h	16,876 h	10,051	8,125	3,637	22,375 e,g	3,433 e	7,230 e	12,327 e	17,276 h	6,703 h	20,464 h
South Bank Tanana I	4,567 f	--	4,979	3,797	5,700	20,820	3,444	2,063	--	1,350 c	2,150	925 c	1,610 c	
Bluff Cabin Slough	1,840 f	5,000 c,d	3,197	6,491	5,340	6,875	3,190	6,130	1,156 e	12,715 e	4,017 e	2,655	3,358 e	9,400 e
One Mile Slough	1,235	745 d	1,552	1,900	475	3,850 c	885 c	632	--	1,115 c	560 c	366 c	1,949	
Subtotal	16,102	9,479 j	16,376	30,334	23,271	42,384	14,056	36,358	4,589 j	22,410 j	19,054 j	22,365	13,720 j	j
Total Tanana Index	50,412	87,764 j	51,566	52,134	58,271	203,474	37,110	50,265	7,898 j	37,515 j	34,915 j	44,189	26,428	
PORCUPINE RIVER DRAINAGE														
Sheenjek River	40,507	78,060	11,866	20,506	14,610 c	41,140	13,027	74,560 k	31,421 k	49,392 k	27,130 k	152,703 k	83,197 k	150,000 k
Fishing Branch River (YT)	31,525 l	353,282 l	13,450	32,500	15,000	44,000	20,319 c	10,549 j	5,846	10,000	5,570	56,016 l	31,173 l,q	49,000 l,q
Total Porcupine River	72,032 m	431,342 m	25,316	53,006	29,610	85,220	33,346	85,109 m	37,267 m	59,392 m	32,700 m	208,784 m	114,370 m	199,000 m
UPPER YUKON TRIBUTARIES														
Chandalar River	17,455	6,345 c,j	58 c,j	4,183	--	--	2,607	4,906 n,j	1,145 n	--	--	2,535 o	59,313 o,k	49,400 o,k
Kluane River (YT)	350 j	367 e,f	20 f	3,555	0 f	4,640 e	3,150	25,806	5,378 e	8,578 e,j	7,200	7,538	16,666	12,000
Yukon River (YT) p	--	7,671	--	--	--	--	--	250 j	1,020	7,560	2,900	10,760	825	6,000
MAINSTEM YUKON CANADA (Tagging)	--	--	--	--	--	--	--	--	34,000 r	89,000 r	--	59,000 r	88,000 r	80,500 r

a Data are peak aerial survey estimates rated fair to good unless otherwise indicated.
b Includes following areas: Toklat River in vicinity of Knights Roadhouse; Sushana River; Geiger Creek. Lower Toklat River counts are included in Total Tanana River Index for years 1975 and 1979.
c Poor survey.
d Combined aerial and ground surveys.
e Ground surveys.
f Survey rating not given.
g Peak aerial count was 10,664.
h Population estimate based upon replicate ground surveys.
i Richardson Highway to Blue Creek.
j Incomplete, partial survey of index area(s).
k Dendix side scan sonar estimate. (For Sheenjek River -- includes expansion for uninsonified mid-river zone).
l Weir counts.
m Figure includes sonar or weir estimate and is not comparable on a year to year basis.
n Fair to poor survey rating.
o USFWS estimates.
p Vicinity of ft Selkirk to Carmacks.
q Preliminary figure.
r Estimated total escapement to Canada (excluding Porcupine R.) from DFO tagging project.
s Preliminary estimates.

Table 9. Coho salmon escapement counts for selected spawning areas in the Yukon River drainage, 1972-1987. a

Year	Nenana River Drainage					Delta Clearwater River d,e	Clearwater Lake and Outlet	Richardson Clearwater River
	Lost Slough	Clear Creek	Wood Creek b	17 Mile Slough	Subtotal			
1972	-	-	-	-	-	632	417	454 g
1973	-	-	-	-	-	3,322	551 d	375 d
1974	1,388	-	-	27	1,415	3,954	560	652 d
1975	943	-	-	956	1,899	5,100	1,575 d,e	4 g
1976	118	13	-	281	412	1,920	1,500 d,e	80 g
1977	524	-	310 c	1,167	2,001	4,793	730 d,e	327
1978	350	-	300 c	466	816	4,798	570 d,e	-
1979	227	-	-	1,987	2,214	8,970	1,015 d,e	372
1980	499	-	1,603 c	592	1,091	3,946	1,545 d,e	611
1981	274	-	849 h	1,005	2,128	8,563 f	459 g	550
1982	-	-	1,436 h	-	1,436	8,365 f	-	-
1983	766	-	1,044 h	103	1,913	8,019 f	253	88
1984	2,677	2,600 b,e	8,805 h	-	14,082	11,061	1,368	428
1985	1,584	-	3,775 h	2,081	7,440	5,358	750	-
1986	794	-	-	218 g	1,012	10,857	3,577	146 g
1987 i	2,511			3,802		22,000		

a Only peak counts presented. Survey rating is fair-good unless indicated otherwise.
b Surveyed by F.R.E.D.
c Foot survey.
d Surveyed by Sport Fish.
e Boat survey.
f Population estimate.
g Poor survey.
h Weir count.
i Preliminary estimates (surveys still underway).

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JK Petersen	FBKS/4539 Tolovana	99709	479-0872		
TA Andrew	Marshall	99585			
JUDE HENZLER	725 CHRISTENSEN Anch	99501	279-6519		
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An Overview of
Yukon River Salmon Fisheries
Issues

March 15, 1987

Prepared by

Alaska Department of Fish and Game
Division of Commercial Fisheries
Director: Kenneth Parker
1255 W. 8th Street
Juneau, Alaska

I. ISSUE: Potential conservation concerns for Yukon chinook salmon.

Chinook salmon spawning populations are widely distributed throughout the Alaskan and Canadian portions of the Yukon River drainage. Total utilization (subsistence and commercial catch combined) of chinook salmon in the Yukon River has increased during recent years. This increase is due to a combination of both larger subsistence catches and commercial harvests that have remained at high levels during recent years. Unusually large returns during the 1979 - 1981 period set a trend for high harvest levels. Beginning in 1982, run strength declined to intermediate levels but harvests have remained high. In addition, during this period of time total Canadian utilization increased by 72%.

Information obtained from scale pattern analysis and tagging studies indicates that some chinook salmon stocks (from both the middle and upper tributaries of the Yukon River) have undergone increased exploitation in recent years resulting in escapements which will not maintain sustained yields. These high

exploitation rates are the result of excessive chinook salmon harvests during years with runs of only average size. It may become necessary to reduce commercial chinook salmon fishing time below that allowed during recent years and/or further delay the opening of the commercial season to provide for adequate spawning escapements and to provide for subsistence harvests.

II. ISSUE: Reduced commercial harvests of Yukon chum salmon due to stock declines.

There are two distinct runs of chum salmon into the Yukon River including a summer run that enters the river prior to July 15 followed by a later fall run that enters after July 15. The size of the 1987 returns for both stocks were well below average which required a significant reduction in the amount of fishing time in order to achieve minimum escapement goals necessary to sustain runs into the future. The 1987 season was the first time in the history of the summer chum fishery that conservation measures had to be taken. Despite the restrictions, spawning escapements in most rivers were below objective levels. The outlook for the summer chum harvest in 1988 is more optimistic with an anticipated average to above average harvest.

The fall chum salmon return in 1987 was expected to be weak and a conservative management plan was readopted by the Board of Fisheries in anticipation of this poor return. The fall chum

salmon run was closely monitored during the season but there was no indication that the return was of sufficient magnitude to provide for a commercial fishery. The run was considered large enough, however, to provide for minimum spawning escapement objectives in a number of key spawning areas and to provide for needs of the subsistence fishery. Assessments of fall chum salmon escapements indicated an overall increase in abundance over the parent years that produced the 1987 return with escapements approaching or exceeding the lower end of the range of escapement objectives. Although the outlook for 1988 is encouraging with the possibility of a small commercial harvest if the return is at projected levels, the Board decided to extend a conservative management plan that has been in effect since 1986 until more average size returns can be established. Starting in 1989 and beyond a return to more average size runs of fall chums is expected.

III. ISSUE: Illegal subsistence roe sales.

During the December Board of Fisheries meeting, Division of Fish and Wildlife Protection (FWP) staff reported to the Board that they were currently investigating the possible harvest and illegal sale of a large number of chum and coho salmon and salmon roe from Districts 5 and 6 of the Yukon Area during 1987. The chum stocks involved are primarily fall chums which have been depressed during the last several years. No commercial fall chum

harvests were allowed in the U.S. portion of the Yukon during 1987. The majority of the fisherman under investigation are commercial fisherman who may have continued to fish during the commercial fall chum closures.

Large scale unreported harvests have several implications for both fisheries managers and the general public. A large unreported harvest may undermine the understanding of the fishery's dynamics needed for effective management. An accurate index of the number of salmon returning to spawning areas is required to assess the productivity of the run. In addition, the possible illegal removal of these fish from the population would deny legal fisherman the opportunity to utilize the resource by diminishing the size and value of future returns. Information uncovered during the investigation suggests that illegal harvest and sale may have been conducted annually since at least 1983.

Sale of roe from subsistence caught salmon was allowed in A-Y-K fisheries prior to 1977. Emergency regulations were adopted to legalize subsistence roe sales in 1974. Legislative action legalized the sale of subsistence roe in 1975 and 1976; however, the statute sunseted January 1, 1977. In addition to concerns about reported waste, sale of subsistence roe resulted in increased harvest levels of salmon resources. The legislature took no action to reauthorize subsistence roe sales during its